IN THE CLAIMS:

11. A system for detecting transverse cracks in rail head on railway track comprising:

a transporter on the railway track, said transporter moving the system along the railway track,

a toroidal-shaped DC magnet mounted to the transporter with its opposing pole ends inwardly directed towards each other and aligned over the rail head,

an inductive coupling between each of the poles and the rail head to magnetically saturate the rail head, the inductive coupling slideably engaging the rail head,

at least one low frequency eddy current probe, centrally located between the poles of the toroidal-shaped DC magnet, for sensing said transverse cracks in the rail head,

protective material on the low frequency eddy current probe,

a separate sensor near said low frequency eddy current probe for sensing non-relevant indications in the rail head, said separate sensor held a predetermined distance above said rail head,

said system rejecting a sensed transverse crack when the separate sensor senses a non-relevant indication,

a carriage mounted to the transporter forcing said low frequency eddy current probe against said rail head, the protective material abutting the rail head when the transporter moves on the railway track thereby protecting the low frequency eddy current probe from damage.

Cancel claim 15.

Cancel claim 17.

18. A method for detecting transverse cracks in rail head of a rail comprising:

moving a transporter on the rail,

generating a saturated magnetic field into and across the rail head with a DC saturation magnet mounted to the transporter a predetermined distance above the rail head

while the transporter is moving, the saturation magnet having a toroidal-shape with opposing pole ends inwardly directed towards each other over the rail head,

inductively coupling the opposing pole ends of the DC saturation magnet with the rail head,

detecting transverse cracks in the rail head with a low frequency eddy current probe mounted centrally between the opposing pole ends of the DC saturation magnetic and over the rail head,

applying a force to the low frequency eddy current probe against the rail head as the transporter moves on the rail,

controlling lift-off of the low frequency eddy current probe from the rail head as the transporter moves on the rail.

19. A method for detecting transverse cracks in rail head of a rail comprising:

moving a transporter on the rail,

generating a saturated magnetic field into and across the rail head with a DC saturation magnet mounted to the transporter a predetermined distance above the rail head while the transporter is moving, the saturation magnet having a toroidal-shape with opposing pole ends inwardly directed towards each other over the rail head,

inductively coupling the opposing pole ends of the DC saturation magnet with the rail head,

detecting transverse cracks in the rail head with a low frequency eddy current probe mounted centrally between the opposing pole ends of the DC saturation magnetic and over the rail head,

applying a force to the low frequency eddy current probe against the rail head as the transporter moves on the rail,

controlling lift-off of the low frequency eddy current probe from the rail head as the transporter moves on the rail,

sensing non-relevant indications in the rail head with at least one separate sensor,

rejecting a detected transverse crack by the low frequency eddy current probe when it corresponds to a sensed non-relevant indication by the at least one separate sensor.